

# Smart Campus Construction Based on Blockchain Technology

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## Abstract

With the rapid development of the new generation of information technology, the digital level of university management is getting higher and higher. The use of the current advanced information technology means can better serve education and greatly improve the level of university management. This paper describes the smart campus data center based on block chain technology and the application of block chain technology in smart campus, including smart library, campus curriculum arrangement, student records retrieval and arrangement, etc.

**Keywords:** Blockchain, Smart campus, Data center.

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## I. INTRODUCTION

Blockchain technology is gradually mature, and its penetration and application in more fields, especially the application in the construction of smart campus, not only promotes its continuous improvement, but also guarantees information security. It is of great significance for the reform of teaching methods and teaching models, the realization of resource sharing, and the improvement of teaching and classroom quality.

In 2021, the Ministry of Education issued a relevant notice on the "Blockchain Technology Innovation Action Plan for Universities and Colleges". We need to actively leverage the technological innovation advantages of colleges and universities to better promote the application and development of blockchain technology in education.

"Universities and Colleges should complete the layout and construction of a number of blockchain technology innovation bases before 2025, and gather blockchain technology crucial team, cultivate a batch of blocks to achieve the all-round, major layout and characteristics of the development of the overall pattern, let colleges and universities of high level creative talents and high quality of scientific and technological achievements continue promoting the development of block chain as a whole. Promote universities and colleges to become the main front of blockchain technology innovation, continue to transform their blockchain technology achievements into production capacity, and drive the continuous development, management and application of blockchain innovation technology." is the overall goal of the Action Plan.

## II. SMART CAMPUS DATA CENTER BASED ON BLOCKCHAIN TECHNOLOGY

Blockchain technology is a product of network development, but also a new computer application mode of point-to-point transmission, encryption algorithm, data storage, consensus mechanism. It breaks through the problem that the traditional technology network exchange is not trusted. Compared with campus digital technology, smart campus built on the basis of blockchain technology has significant advantages in data storage security, and blockchain technology has a larger development space for the construction of virtual smart campus. In particular, it plays an important role in protecting the basic data security of smart campus, managing campus assets and realizing campus network security.

The smart campus platform based on blockchain technology can collect and analyze students' life and study through network features, which can make students' school situation transparent, so as to facilitate the analysis and collection of students' learning situation. Administrators can register and record the specific information of students through the management module to ensure that students' life and school conditions are effectively recorded. In addition, the smart campus system will conduct identity authentication for students and teachers, and protect edge devices through identity identification, so as to ensure the integrity and confidentiality of data information, so as to protect the personal privacy of students and teachers. The identity identification of students in smart campus mainly relies on the blockchain identity cognition technology. Students and teachers

only need to register once and can use and log in on multiple platforms. In addition, blockchain technology distributed storage, can better hide and protect identity information to ensure the security of teachers and students information.

### **III. THE APPLICATION OF BLOCKCHAIN TECHNOLOGY IN SMART CAMPUS**

Smart campus is an integrated intelligent environment that closely links learning, life and work through cloud computing, big data, Internet of Things and other technologies. The application of communication equipment and science and technology to smart campus can improve the educational level and management ability of the campus.

#### **3.1 The Smart Library**

Wisdom is the library construction of the library when applying intelligent technology to the forming of the intelligent building, automation management and innovation and the organic combination of intelligent buildings, the main is the use of big data, cloud computing, Internet of things, such as technology, to implement the intelligent of the library management and service, to make up for the traditional library change slowly, shortcomings and so on number of advantages. (1) The application of blockchain technology in the library management system. The structure of blockchain is composed of multiple data blocks, which can be arranged in chronological order to form a linked list. The generation of new blocks is built on the basis of the previous data block, so it has the advantages of anti-counterfeiting and anti-tampering. According to this advantage, a distributed intelligent book storage system can be built to ensure information security. Rich resources of books in university library can be stored in the management system in the form of Numbers, not only facilitate the management of books, but also can improve the utilization ratio of books, in addition, the teachers and students can be their own papers published in the journal management system, the students through certification can free access to information, this way is to broaden the resource abundance, can mobilize students and teachers' creative enthusiasm. The application of blockchain technology in smart library can ensure data security and avoid malicious tampering, which plays an important role in the transformation of library identity. (2) The application of blockchain technology on students. For traditional libraries, there is a lack of interaction between students and libraries, but the application of blockchain decentralization technology to libraries can weaken the central role of libraries, so as to carry out direct communication and interaction between resources and students, and between students and students. With the advantage of blockchain distributed storage, a personalized library management platform can be customized. By combining cloud computing, big data, Internet of Things and other technologies, the reading data of students can be collected and analyzed, so as to provide personalized recommendations for students and expand the library's services and business. (3) The application of blockchain technology in the interactive terminal.

Using the bookkeeping function of blockchain technology, the system of students' points and rewards is built to connect students with the smart library, so as to improve students' learning level and quantitative reading quantity. Students' individual points can be obtained through the following channels: (1) Convert students' study time and reading time on the Smart Library system into study points. (2) Personal works and papers published by students on the smart book management system. (3) Students' ranking in teaching and competition will be converted into learning points. The amount of points obtained not only represents the knowledge wealth of students in school, but also can be used as credit points for students to exchange learning resources, which can greatly improve students' enthusiasm in learning knowledge.

#### **3.2 Campus curriculum arrangement**

At present, most universities in our country usually rely on the academic administration system to issue the curriculum, which increases the difficulty of the amendment and query of the curriculum. If the temporary teaching activities are carried out in colleges and universities, there is the situation of course adjustment and the notice of course adjustment is not timely, it will cause the problem of classroom arrangement is not in place. Using block chain technology open and transparent, not fake, the advantages of the full marks, cannot be changed, building block chain information management platform, to a large number of traditional publishing information model, will be released information receiving and collection in a platform, and carries on the real-time updating, can for the teachers' and students' campus life bring great convenience. (1) Release of class schedule information. Application of technology of block chain, need to build a data platform, on the platform in and out of curriculum, the information such as location, time, after verification and validation, data platform can form unique and uniqueness of the hash value, using the hash value connection subsequent blocks, thus want to into a complete block chain, chain blocks, place, time and other information contained in the course, if the teachers want to adjust the class, You only need to delete the original block chain, and use the data platform to query and screen the classroom without reservation. After determining the location of the classroom and the teaching time, you only need to upload the information, and the data platform will form a new block chain and automatically add the

missing location. (2) Receiving of class schedule information. Another advantage of blockchain technology is that it can realize information sharing. Users on blockchain can clearly see all data, and students in colleges and universities can share campus information in real time, which provides convenience for students and teachers to consult and arrange class hours. In addition, blockchain technology can also be integrated with other programs to form intelligent and sound teaching systems, such as after class, during class, examination supervision and scientific evaluation of course arrangements.

### **3.3 Collect and arrange school records**

The system for retrieving and sorting school records is mainly based on the decentralized characteristics of blockchain technology. Through the collaborative participation of multiple parties, the student records on the blockchain are regarded as the main body of management, and different nodes are adjusted with the help of blockchain consensus technology, so as to achieve unified management and maintenance. With the help of consensus technology, students' school records will form a contract according to their own authority and needs and operate on the blockchain, so as to achieve the purpose of communication between subjects. (1) Accuracy of school records. In order to ensure the accuracy of school roll information, it is necessary to jointly supervise and maintain school roll files to manage the subjects of different nodes. Only when the current node is consistent with other data information, the node will link the correct school roll files. The link of information is mainly based on the timestamp and encryption technology of blockchain, and the algorithm is used to timestamp and encrypt the archive information, so as to ensure the security of the archive information. When retrieving archive information, the information subject will verify the identity information according to the key retrieval request, that is, the smart contract is run. After the identity verification, the key will be automatically opened, and the management personnel can retrieve and organize the archive information. (2) Security of school records. In order to ensure that the student roll file is not tampered with at will, it can be managed through the blockchain consensus mechanism. Only when multiple nodes are consistent, can the student roll information be changed. The management system will automatically record and save the modification of school roll file information, so as to facilitate the follow-up management work.

## **IV. CONCLUSION**

Blockchain technology can ensure the authenticity and accuracy of information and promote the development of the sharing economy. In the future, both academic certificates and degree certificates, as well as original papers, achievements and articles, can be permanently stored in digital form using blockchain technology. The application of blockchain technology in smart campus will bring more convenience to students' campus life. The advantages of blockchain technology enable it to have a broad space for development, and the functions and services of smart campus will also be diversified.

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